

Bruce puts it, "after more than sixty years of doubt, Ross Deep was removed from the map, and all the bathymetrical maps based upon this sounding were no longer of any practical use. It is interesting to contrast the methods of sounding employed on the two occasions by

through South Georgia to the Falkland Islands and South American continent." . . . "Antarctica, South America, and Madagascar, become connected with one another in a most direct manner by this 'rise.'" Basing his arguments on these discoveries, Mr. Bruce strongly opposes Sir Clements Markham's theory, set forth in his recent address to the Royal Geographical Society, that the Antarctic area consists of two land masses of unequal size, Victoria Land and Edward VII. Land, separated by a great barrier of ice, and of two seas extending far to the south, the Ross Sea and the Weddell Sea.

The papers by Dr. Harvey Pirie and Mr. Mossman contain many points of great interest, although in the nature of things the material collected requires further elaboration, and comparison with that of the other expeditions, before its full value becomes apparent. Dr. Harvey Pirie's observations give much additional information bearing on the variations in the relative amounts of diatoms in the surface waters and in the deposits, and the remarkable differences in the meteorological values for 1903 and 1904 enable Mr. Mossman to draw many important conclusions as to the factors controlling the climate. Mr. Rudmose Brown gives an interesting account of an island which has, curiously enough, remained unexplored until now, although it lies almost on the track of sailing-ships outward bound *via* the Cape of Good Hope.



FIG. 2.—*Scotia* beset in heavy ice in $74^{\circ}1'$ S. off Coats Land. The shearlegs show the position of the baited trap in 161 fathoms.

comparing Mr. Bruce's photographs, which we reproduce, with the illustration given in Ross's book. Another discovery of great importance is that of a ridge showing a continuation of the "South Atlantic rise" a thousand

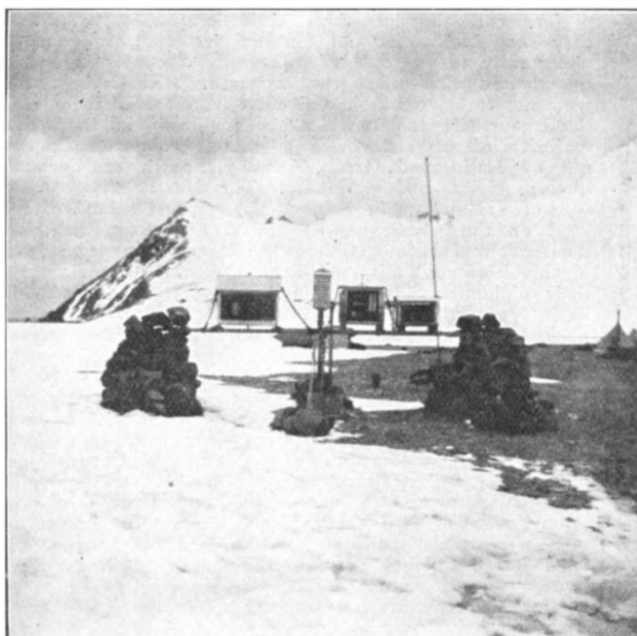


FIG. 3.—Meteorological Instruments at *Scotia* Bay.

miles further south than it was previously known to exist. There is thus a ridge "extending in a curve from Madagascar to Bouvet Island, and from Bouvet Island to the Sandwich Group, whence there is a forked connection through the South Orkneys to Graham's Land, and

THE PERCY SLADEN EXPEDITION IN H.M.S. SEALARK.

I HAVE just received the accompanying communication from Mr. Stanley Gardiner, bringing the account of his expedition to September 12, the date of his letter. The letter is written from Coetivy. I may remind readers of *NATURE* that his former communications appeared in the issues of August 10 and October 5.

A. SEDGWICK.
Zoological Laboratory, Cambridge, October 23.

Since my last letter Cooper and I have had a tour round the reefs of Mauritius, and have for the last three weeks been working between the latter island and the Seychelles Group. The Mauritius reefs vary from fringing to barrier, the best example of the latter being at Grand Port, where it is four miles from the land. It has there a few small islets of somewhat metamorphosed coral-rock, varying up to 40 feet high. At first it seemed as if they might have been formed by hurricanes and blown sand, but we discovered the same rock in the immediate vicinity overlying a basalt, 70 feet above the water. The present islets probably represent the remains of a considerable island, elevated for at least 100 feet, extending along that part of the barrier reef.

Leaving Mauritius on August 21, we had three days' dredging and sounding off its reefs. The contour is the same as that off atoll-reefs, a gradual slope to 40 fms. (fathoms), succeeded by a steep to 150 fms., then tailing off in five miles to 1000 fms. The bottom at 150 fms. was covered by heavy blocks of coral from the reef above. At 300 fms. we found shell and small pieces of coral, and further out a bottom of bare coral mud, sweepings from the reef and land.

Between Mauritius and Cargados there was a depth of 1962 fms., there being no marked connecting ridge, though the bottom tails off very gradually from each bank. At Cargados we remained for six days, examining the reefs and islets, and dredging. It is a crescentic-shaped surface reef, 31 miles long, on the south part of the Nazareth Bank, which is roughly 220 miles long by 60 broad, with an average depth of 33 fms. The land is of coral rock with no signs of elevation, and is a great breeding resort for tern. It is covered with guano, owing to which the land flora is very scanty, only 18 different plants being found. Naturally land animals were scarce, but 42 insects were secured, four-fifths from the guano.

Cooper for the most part took the dredgings, and he reported to me that he found near Cargados "a wonderfully constant depth of 30-35 fms. over the body of the bank, while towards its western edge there is a slight but uniform rise to 27 fms., thus suggesting an incipient atoll with its eastern side slightly tilted up above its western. Over the plateau, where 30 hauls were made in different directions, the bottom was either coral-rubble, white sand, shell-rubble, or weed. The three latter occurred only in the central parts of the bank, while the coral-rubble, though also found there, alone formed the raised edge of the western side, being mostly in the form of large lumps. From this rubble, which is of a bright red colour due to an encrusting nullipore, we obtained a rich variety of animal life, nearly all forms tinted with red. The absence of living corals from the rim as well as from the plateau in all depths over 20 fms. was a noticeable feature." About 25 different species of algæ (not lithophytes) were dredged, several from 40-50 fms. on the outer slope, though none have so far been secured from more than 60 fms.

In the channel midway between Nazareth and Saya de Malha banks we found a depth of 222 fms., the connection being a ridge rapidly tailing off on its western side to more than 800 fms. Saya de Malha itself really consists of three banks, a northern, a very large central, and a small south-eastern. The north bank we found to be separated by a channel of 636 fms. from the central, while the depth between the latter and the southern bank is only 130 fms. All are of more or less atoll form, but the south side of the central bank differs from all other parts of the same banks and from the Nazareth Bank in tailing off *very gradually* from 65 fms., the general depth in its centre, to 200 fms. The area in this part beyond 120 fms., which is to some degree protected from the prevailing south-east winds and currents, formed a rich collecting ground, the bottom being composed of a white rubble of bivalve and sea-urchin shells, evidently all swept off the shallower bottom above. From 80 to 100 fms., where it is more exposed, the bottom is hard, being swept bare by the currents, but still further north at 60 fms., where the eastern edge of the bank has only 10-20 fms. of water, is soft mud with casts of pelagic foraminifera. A considerable number of dredgings were taken at depths above 20 fms., and fair collections have been obtained. Only the regular deep-living corals were secured, but two hauls at 26 and 29 fms. gave between them more than 20 species of corals, typical of shallow reefs. To the north of the banks we dredged between 300 and 500 fms., the bottom being of the usual character at such depths off coral reefs, though with rather more rubble.

Leaving the Saya de Malha banks we ran a line of soundings to the shallow bank, which surrounds the Seychelles, the greatest depth found being 961 fms. Thus our soundings prove the existence of a crescentic-shaped ridge, 1100 miles long, with less than 1000 fms. of water, arising on either side from a general depth of 2200 fms.

Now we are at Coetivy, the most southerly island of the Seychelles Group. It is an atoll bank with a large island to the east, where we shall camp for ten days, while the ship goes to the Seychelles for coal. On her return we propose to examine the line connecting the Seychelles to Madagascar.

J. STANLEY GARDINER.

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SOME CHARACTERISTICS OF AMERICAN UNIVERSITIES.¹

THE total amount of private benefactions to university education in the States during the last thirty years reaches the amazing figure of forty millions sterling; and this is quite apart from the large annual appropriations made by the Federal Government and by the State Governments for technical colleges and State universities. The total amount contributed by private benefactions in the same period in these islands was about five millions.

The number of professors, lecturers, and other teachers in the American universities and institutions of university standing is very little short of the total number of university students in the British Isles; the figures are respectively 17,000 and 20,500.

A large and increasing number of the greatest industrial and commercial firms in America restrict their highest posts to college graduates. In Montreal two great railway companies—the Canadian Pacific and the Grand Trunk—have just clubbed together to establish and endow in McGill University a department of railway engineering for training the first-rate staff of officials, which they feel to be indispensable to the rapid extension of their lines in the great north-western territories now awaiting development. Of our own industrial leaders, it would be safe to say that at least nine out of ten would regard a college training as an absolute disqualification.

The vigour of the professional schools is to be explained by two features which differentiate them from our own:—(1) The presence of a culture element; (2) the close and almost organic connection between academic and industrial life.

(1) Where a professional or higher technical school is established in England, the tendency is to make it purely technical, to banish all literary studies, and confine the student's attention strictly to scientific study directly bearing on his future profession. In America a broader view is taken.

The great Morrill Act for agricultural and mechanical colleges was thus expounded by its author:—"These colleges were not established for the sole purpose of teaching agriculture. It was never intended to force the boys of farmers going into these institutions so to study, that they should all come out farmers, but to give them an opportunity to do so if they saw fit. Secondly it was a *liberal education* that was proposed. Classical studies were not to be excluded, and must therefore be included."

But further, the technical course itself in the great majority of cases includes a culture element, supplied not by Latin and Greek, but by French or German, history, civics, and economics. The Massachusetts Institute of Technology in Boston, the greatest school of the kind on the Continent, the Pratt Institute (Brooklyn), the Armour Institute (Chicago), all make literary studies of this kind an indispensable part of the curriculum for their diplomas. The same is true of the great Guelph College of Agriculture in Ontario: French, German, and English literature have to be studied before the student can graduate as B.S.A. of the University of Toronto; and the reason was well put by the principal:—"It is not sufficient that our graduates should know their professional work, they must have some knowledge of their fellow-men and power of holding their own and of presenting their subject to the educated public, which a purely technical training cannot give." These are the words of a remarkable man who found Guelph in 1884 on the verge of extinction, and in twenty years has raised it to a position of almost undisputed primacy among the agricultural colleges of the continent, and transformed thereby the agricultural industry of central Canada.

(2) Both professors and students are in the closest touch with the industry which the school is intended to feed. The former are not merely permitted, but encouraged to take private outside work. The latter are required to spend some part at least of their vacations in working in mines, engineering works, on farms, &c., as the case may be, and their reports on the work thus done contribute

¹ Abridged from an address delivered before the Guild of Graduates of the University of Wales at Aberystwyth, by Principal H. R. Reichel.